Claims

1. A reactor of the staged adiabatic reactor type, comprising at least one heat exchanger panel interposed between adiabatic beds of catalyst, wherein the facial area of the panels and the superficial facial area of the corresponding catalyst are substantially similar, and the panels include means defining discrete passages for handling of reactants and heat transfer media, wherein the means defining passages for heat transfer media provide for at least two differing flow path directions for the heat transfer media through the said heat exchanger panel whereby the occurrence of temperature bias or differentials is reduced.

2. A reactor according to claim 1, wherein the heat exchanger panel is entirely of the printed circuit heat exchanger type (PCHE) wherein a plurality of plates are superposed and diffusion bonded to form a stack of plates, and wherein fluid passages are defined in said stack by virtue of a pre-treatment of said plates wherein each plate is selectively configured to provide channeled or blank surfaces according to the desired pattern of fluid passages by treatment to remove surface material.

3. A reactor according to claim 2, wherein at least two differing plate designs are used to make up the panel.

4. A reactor according to claim 2, wherein plates of substantially the same design such as square plates are juxtaposed in a stack, each plate having a particular pattern of passages etched out on the surface thereof, and passages in different orientations are defined by alternate alignment of successive plates by rotation of the respective plate in the plane of the plate.

5. A reactor according to claim 2, wherein plates having no channeled surfaces (blanks) are incorporated in the panel where necessary to prevent intermixing of fluids.

6. A reactor according to claim 1, including a chemical reaction zone bounded by at least one surface including means for achieving heat exchange with fluids flowing via said zone to achieve a reaction, said zone and said surface at least in part being defined by a printed circuit heat exchange (PCHE) panel, said panel defining discrete passages providing for flow of fluid reactants and a heat transfer medium, wherein at least two different flow paths are defined by the PCHE plate design for handling the heat transfer medium, whereby said heat transfer medium is permitted to pass in at least two differing directions with respect to the flow of fluid reactants via the

PCHE panel and thereby particularly provide for improved control of the reactant temperature profile of fluids passing out of the PCHE panel.

7. A reactor according to claim 6, wherein the fluid flow passages are configured to provide that the heat transfer medium makes more than one pass along the length of the plate.

8. A reactor according to claim 7, wherein the fluid flow passages comprise serpentine portions including a series of short sharp turns.

9. A reactor according to claim 6, wherein the fluid flow passages comprise a zig-zag pattern imposed upon substantially the whole length of each individual passage.

10. A process for performing chemical reactions under controlled temperature conditions, such as in reactors of the staged adiabatic type, said process comprising,

delivery of fluid reactants successively via a chemical reaction zone to achieve a reaction and heat exchanger means, said zone being bounded by at least one surface including means for achieving heat exchange with said fluids, said surface at least in part being defined by a printed circuit heat exchange (PCHE) panel providing means defining discrete passages providing for flow of a heat transfer medium therein, and further passages providing for flow of reactant fluids,

introducing heat transfer medium to said PCHE panel, and causing same to pass in at least two differing directions with respect to the flow of fluid reactants via said PCHE panel to provide for improved control of the reactant temperature profile of fluids passing out of the PCHE panel.